

U.S. Serial No. 10/052,466
Attorney Docket No. 70434-0024
Amendment under 37 C.F.R. §1.312

IN THE SPECIFICATION:

Please amend the paragraph beginning at page 1, line 23 as follows:

The conventional diode 7 has disadvantages in that since the current tends to pass through a the shortest distance from the p-electrode metal contact 71 to the n-electrode metal contact 72 by virtue of a smaller resistance for the shortest distance, there will be a much higher current density in an area proximate to a diagonal line defined by the two corners and a negligible amount of current in an area that is distal from the diagonal line. As a consequence, the active region in the diode 7 for emitting light is not effectively utilized, thereby resulting in a low light-emitting efficiency for the conventional diode 7.

Please amend the paragraph beginning at page 2, line 16 as follows:

According to one aspect of the present invention, there is provided a semiconductor diode comprising a semiconductor die that includes a substrate, a first semiconductor film formed on the substrate, a second semiconductor film formed on the first semiconductor film, a first metal contact formed on the first semiconductor film, and a second metal contact formed on the second semiconductor film. One of the first and second semiconductor films is made of an n-type semiconductor material. The other one of the first and second semiconductor films is made of a p-type semiconductor material. The semiconductor die has two opposing first side edges and two opposing second side edges which ~~cooperates~~ cooperate with the first side edges to define thereamong two diagonally opposite first corners and two diagonally opposite second corners. The first semiconductor film has an exposed area that is exposed from the

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second semiconductor film adjacent to one of the first side edges and that extends between said one of the first corners and one of the second corners. The first metal contact has a first strip portion that is formed on the exposed area, and a first bonding portion that extends from and that a width greater than that of the first strip portion and a length less than that of the first strip portion. The second metal contact is disposed adjacent to the other one of the first side edges and has a second strip portion that extends between the other one of the first corners and the other one of the second corners, and a second bonding portion that extends from and that has a width greater than that of the second strip portion and a length less than that of the second strip portion.

Please amend the paragraph beginning at page 3, line 22 as follows:

According to another aspect of the present invention, there is provided a method for manufacturing semiconductor diodes. The method comprises the steps of: preparing a substrate; forming a first semiconductor film on the substrate; forming a second semiconductor film on the first semiconductor film, wherein one of the first and second semiconductor films is made of an n-type semiconductor material, and the other one of the first and second semiconductor films is made of a p-type semiconductor material; selecting masking and etching the second semiconductor film to define a plurality of orderly arranged exposed areas on the first semiconductor film which are exposed from the second semiconductor film; forming a plurality of orderly arranged first metal contacts on the exposed areas of the first semiconductor film, respectively, and a plurality of second metal contacts on the second semiconductor film, each of the second

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metal contacts being associated with a respective one of the first metal contacts; and dicing assembly of the substrate, the first semiconductor film, the second semiconductor film, the first metal contacts, and the second metal contacts to form a plurality of semiconductor dies, each of which has two opposing first side edges and two opposing second side edges which ~~coöperates~~ cooperate with the first side edges to define thereamong two diagonally opposite first corners and two diagonally opposite second corners. The exposed area on the first semiconductor film of each of the semiconductor dies is disposed adjacent to one of the first side edges and extends between one of the first corners and one of the second corners. The first metal contact of each of the semiconductor dies has a first strip portion that is formed on said the exposed area, and a first bonding portion that extends from and that has a width greater than that of said the first strip portion and a length less than that of said the first strip portion. The second metal contact of each of the semiconductor diodes is disposed adjacent to the other one of said the first side edges and has a second strip portion that extends between the other one of said the first corners and the other one of said the second corners, and a second bonding portion that extends from and that has a width greater than that of said the second strip portion and a length less than that of said the second strip portion.

Please amend the paragraph beginning at page 6, line 2 as follows:

Figs. 4 and 5 ~~illustrates~~ illustrate formation of cutting lines, an n-electrode metal contact, and a p-electrode metal contact on the assembly of Fig. 3 according to the method of this invention; and

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Please amend the paragraph beginning at page 8, line 16 as follows:

The processing steps in the preferred embodiment of the method of this invention ~~includes~~ include: preparing a substrate 10; forming an n-type semiconductor film 11 on the substrate 10; forming a quantum well 13 on the n-type semiconductor film 11; forming a p-type semiconductor film 12 on the quantum well 13; forming a thin ohmic metal contacting film 14 on the p-type semiconductor film 12, which can be made from nickel or indium tin oxide (ITO) and which has a thickness of about 100Å and a transparency of about 90%; selectively masking and etching the ohmic metal contacting film 14, the p-type semiconductor film 12, the quantum well 13, and an upper portion of the n-type semiconductor film 11 to define a plurality of orderly arranged exposed areas 21 on the n-type semiconductor film 11 which are exposed from the p-type semiconductor film 12 and the metal contacting film 14; selectively masking assembly of the metal contacting film 14, the p-type semiconductor film 12, the quantum well 13, the n-type semiconductor film 11, and the substrate 10 to define a plurality of intersecting first and second cutting lines 31, 32 on the assembly; forming a plurality of orderly arranged n-electrode metal contacts 41 (only one contact is shown) on the exposed areas 21 of the n-type semiconductor film 11, respectively, via vapor deposition of aluminum or titanium by employing photo-masking and lift-off techniques; forming a plurality of orderly arranged dielectric films 61 (only one contact is shown) on the metal contacting film 14; selectively forming a plurality of p-electrode metal contacts 51 (only one contact is shown) on the dielectric films 61, respectively, via vapor deposition of aluminum or titanium by employing photo-masking and lift-off techniques; and dicing

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assembly of the substrate 10, the n-type semiconductor film 11, the quantum well 13, the p-type semiconductor film 12, the metal contacting film 14, the dielectric films 61, the n-electrode metal contacts 41, and the p-electrode metal contacts 51 along the intersecting first and second cutting lines 31, 32 to form a plurality of semiconductor dies 1, each of which includes one of the n-electrode metal contacts 41 and an associated one of the p-electrode metal contacts 51 and each of which has two parallel first side edges 101 and two parallel second side edges 102 that interconnect the first side edges 101 to define thereamong two diagonally opposite first corners 103 and two diagonally opposite second corners 104.

Please amend the paragraph beginning at page 10, line 12 as follows:

The exposed area 21 on the n-type semiconductor film 11 of each of the semiconductor dies 1 extends from one of the first corners 103 along one of the first side edges 101 to one of the second corners 104. The n-electrode metal contact 41 of each of the semiconductor dies 1 is formed on and extends along the exposed area 21 from said the specified one of the first corners 103 to said the specified one of the second corners 104. The p-electrode metal contact 51 of each of the semiconductor diodes extends from the other one of the first side edges 101 to the other one of the second corners 104. The n-electrode metal contact 41 has a first wire-bonding section 411 disposed at said the specified one of the first corners 103, and an elongated first extension section 412 extending and reducing from the first wire-bonding section 411 to said the specified one of the second corners 104. Similarly, the p-electrode metal contact 51 has a second wire-bonding section 511 disposed at the other one of the first

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corners 103, and an elongated second extension section 512 extending and reducing from the second wire-bonding section 511 to the other one of the second corners 104. The second wire-bonding section 511 of each of the p-electrode metal contacts 51 has a geometric dimension greater than that of the respective dielectric film 61, and has a central portion overlapping with the respective dielectric film 61, and a peripheral edge in electrical contact with the metal contacting film 14 so as to prevent an electric current from concentrating at the second wire-bonding section 511 and so as to rapidly and evenly distribute the electric current through the second wire-bonding section 511 and the second extension section 512.

Please amend the paragraph beginning at page 12, line 1 as follows:

By virtue of extending the n-electrode metal contact 41 from said the specified one of the first corners 103 to said the specified one of the second corners 104 of each semiconductor die 1, and the p-electrode metal contact 51 from the other one of the first corners 103 to the other one of the second corners 104 of each semiconductor die 1, the electric current can be distributed uniformly across the quantum well 13 (see Fig. 6, wherein the broken arrow lines schematically illustrate how electric current is distributed in the semiconductor die 1 of this invention), thereby increasing the light-emitting efficiency of the semiconductor diode of this invention.